TAC Meeting – June 18, 2007
Announcements from the Chair

Tonight's meeting is focused on a TAC discussion of the pros and cons of the Treatment Technology alternates for the Los Osos wastewater project as they have been presented to us by the County Project Team in their Viable Project Alternatives Fine Screening Analysis.

As you are aware we are now televising our meeting live on channel 20 and I would like to thank the County for making that possible. It is our hope that by listening in on our deliberations of the pros and cons of the component alternatives, the community will gain a better understanding of the potential solutions to the Los Osos wastewater problem.

I also would like to announce that you may follow the progress of our pro/con analysis by visiting our website (http://www.slocounty.ca.gov/PW/LOWWP), select the TAC page and then the link to the working draft Pro/Con Analysis on Project Alternatives. This report will be updated weekly as we proceed through our analysis. We encourage you to send us any of your questions or comments on this report. Our e-mail address is LOWWP@co.slo.ca.us

You will note that we have again changed the format of our meetings in order to engage the community. We will now take public comments and questions after the three committees have presented their draft of the pros and cons and before the TAC begins its discussion.

Only comments and questions pertaining to the alternate Treatment Technologies will be allowed at that time. If you have any other comment or question relating to the TAC and it role there is a second public input period on the agenda. Questions to the Project Team will be answered as time permits at the end of the meeting. Please be sure and fill out Public Input slips and hand them in to a member of the project staff.

Remember tomorrow beginning at 6 PM the Project Team will be hosting a town hall meeting at the Los Osos Middle School where they will present the Fine Screening Analysis to the community. I suggest that questions to the project team be held until that meeting.

Our next TAC meeting will be one week from tomorrow evening, Tuesday June 26, and the topic will be alternate collection systems. That meeting will also start at 7PM.

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works

TAC

APPARENT LOW COST TREATMENT TECHNOLOGY ALTERNATIVES

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works

TAC

Biolac
10 acres
750'x580'

Scale = 1" = 150'

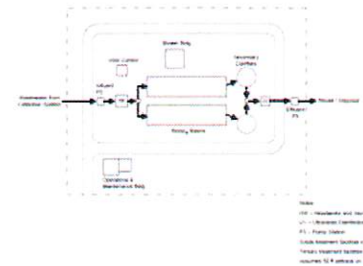


Figure 4.10
BIOLAC
LOS OSOS WASTEWATER PROJECT DEVELOPMENT
SAN LUIS OBISPO COUNTY

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works

TAC

Oxidation Ditch
8 acres
670'x520'

Scale = 1" = 150'

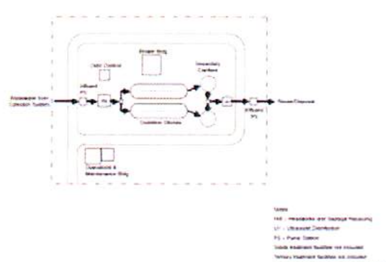


Figure 4.9
OXIDATION DITCH
LOS OSOS WASTEWATER PROJECT DEVELOPMENT
SAN LUIS OBISPO COUNTY

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works

TAC

Partially Mixed Facultative Ponds
20 acres
1,050'x820'

Scale = 1" = 150'

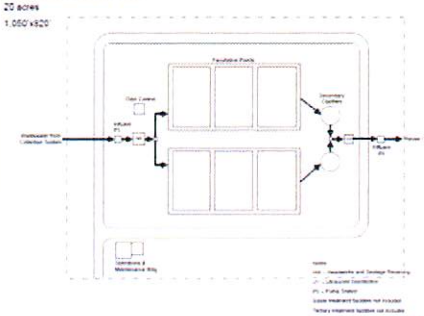


Figure 4.8
PARTIALLY MIXED FACULATIVE PONDS
LOS OSOS WASTEWATER PROJECT DEVELOPMENT
SAN LUIS OBISPO COUNTY

	Extended Aeration 6 acres		BIOLAC w/ gravity 10 acres		BIOLAC w/step 8 acres		SBR 6 acres	
Criteria	PRO	CON	PRO	CON	PRO	CON	PRO	CON
Construction Impacts				• Largest footprint of systems < ponds				
Community Impact	• Odor control feasible			• Size prohibits odor control			• Odor control feasible	
Biological Impact (1)				• Size required for treatment technology				
Archeological Resources(1)				• Size required for treatment technology				
Energy Use	Unable to determine PRO/CON for energy use due to the decoupling of the treatment from the solids treatment and disposal. We referred to table 4.11.							

(1)Table 4.18

	Oxidation Ditch 8 acres		Trickling Filters 6-8 acres		Partial Fac.Ponds 20 acres		MBR ? acres	
Criteria	PRO	CON	PRO	CON	PRO	CON	PRO	CON
Construction Impacts						• Earth moving • Diesel • Noise • Dust		
Community Impact		• Odor control costly(2)	• Odor control feasible			• Pond size prohibits odor control	• Enclosed facility odor control	
Biological Impact (1)								
Archeological Resources (1)						• Size required for treatment technology		
Energy Use	Unable to determine PRO/CON for energy use due to the decoupling of the treatment from the solids treatment and disposal. We referred to table 4.11							

(1)Table 4.18
(2) Table 3.1 of the Rough Screening Report

PROS AND CONS OF TREATMENT TECHNOLOGIES
TAC Financial Working Group

Draft 6/15/07

OXIDATION DITCH

FINANCIAL	PROS	CONS
Capital Costs ▪ Construction costs ▪ Road impacts ▪ Cost implications with collection system ▪ Costs of future upgrades	- Requires 8 acre site - Moderate cost for plant construction ($16-19.1M) - Denitrification of flows for Broderson discharge included in cost of construction	- Tertiary treatment required for agriculture or urban reuse (+$1.6 – 3.5M)
Operation & Maintenance ▪ Energy requirements ▪ Maintenance, repair, & replacement costs ▪ Impact on cost of solids handling/ disposal	- Low O&M with a STEP collection system ($570,000/ year) - Denitrification of flows for Broderson discharge included - Moderate energy usage with a STEP collection system (800,000 kWh/yr) - Less solids residence time (8.1- 9.5) - Less volume of water in aeration basins (May imply less water is needed in process?)	- High O&M costs with Gravity collection system ($690,000/ year) - Moderate to high energy usage with a Gravity collection system (900,000 kWh/yr) - Tertiary treatment required for agricultural or urban reuse (+$30,000 - $100,000/ year)
Financial Risks ▪ Cost implications of achieving groundwater balance		- Unknown risk of leakage or failure

BIOLAC

FINANCIAL	PROS	CONS
Capital Costs ▪ Construction costs ▪ Road impacts ▪ Cost implications to collection system, piping ▪ Costs of future upgrades	- Requires 8-10 acre site - Low to moderate cost for plant construction ($13.7 – 16.4M. These costs represent the *upper* end of the baseline value, and still result in a 20% savings over the Oxidation Ditch facility.. - Denitrification of flows for Broderson discharge included in cost of construction - Lowest BOD content in effluent (1 with Gravity; 3 with STEP) - May be able to expand/ upgrade by simply adding aeration basins – to be determined	- Tertiary treatment required for agricultural or urban re-use (+$1.6 – 3.5M)

Operation & Maintenance ▪ Energy requirements ▪ Maintenance, repair, & replacement costs ▪ Impact on cost of solids handling/ disposal	- Low O&M with a STEP collection system ($550,000/ year) - Denitrification of flows for Broderson discharge included in cost of construction - Moderate energy usage with a STEP collection system (800,000 kWh/yr)	- High O&M costs with Gravity collection system ($700,000/ year) - Moderate to high energy usage with a Gravity collection system (1,100,000 kWh/yr) - Tertiary treatment required for agricultural or urban reuse (+$30,000 - $100,000/ year) - Longer solids residence time (25.6)
Financial Risks ▪ Cost implications of achieving groundwater balance		- Unknown risk of leakage or failure

PARTIALLY MIXED FACULTATIVE PONDS

FINANCIAL	PROS	CONS
Capital Costs ▪ Construction costs ▪ Road impacts ▪ Cost implications to collection system, piping ▪ Costs of future upgrades	- Low cost for plant construction ($13.1- 14.2M)	- Requires 20 acre site - May require Nitrification to convert ammonia into nitrate before denitrification (+$1.0- 3.8M in construction costs). See (1) - Requires Denitrification of flows for Broderson discharge (+$2.2- 3.6M in construction costs). - High BOD content (10) in effluent for Gravity collection system. (Note: with STEP system, BOD in Ponds is 4.) - Tertiary treatment required for agricultural or urban reuse (+$2.1- 4.0M)
Operation & Maintenance ▪ Energy requirements ▪ Maintenance, repair, & replacement costs ▪ Impact on cost of solids handling/ disposal	- Low O&M with a Gravity or STEP collection system ($510,000/ year) - Low energy usage with a Gravity or STEP collection system (600,000 kWh/yr) - Reduces cost of solids handling/ disposal - Reduces traffic for sludge removal	- May require Nitrification to convert ammonia into nitrate before denitrification (+$30,000- 90,000/ year). See (1) - Requires Denitrification of flows for Broderson discharge (+$90,000- 250,000/ year). - Tertiary treatment required for agricultural or urban reuse (+$60,000- 130,000/ year)
Financial Risks ▪ Cost implications of achieving groundwater balance		

(1) The ability of a partially mixed facultative pond system to fully nitrify should be ascertained during value engineering. This could substantially reduce the costs associated with nitrification.

TRI-W MBR

FINANCIAL	PROS	CONS
Capital Costs ▪ Construction costs ▪ Road impacts ▪ Cost implications to collection system, piping ▪ Costs of future upgrades	- Requires ~~4~~ 8 acre site - Tertiary treatment included which meets Title 22 for agricultural and urban reuse - Denitrification of flows for Broderson discharge included	- High construction cost ($55M) - Heavy vehicle traffic road impacts in center of town - Requires purchase of additional land for future upgrades
Operation & Maintenance ▪ Energy requirements ▪ Maintenance, repair, & replacement costs ▪ Impact on cost of solids handling/ disposal	- Tertiary treatment for agricultural and urban reuse included	- High O&M with a Gravity collection system ($700,000/ year) - Costs with a STEP collection system not available at Tri-W ***Need energy requirements for comparison**
Financial Risks ▪ Cost implications of achieving groundwater balance		

PROS AND CONS OF TREATMENT TECHNOLOGIES
TAC Financial Working Group

Draft 6/15/07

CONSTRUCTION COSTS

Treatment Technology	Construction		Nitrification/ Denitrification (1)		Tertiary Treatment(3)		Total Cost Level 2 Treatment		Acerage Required	
	Gravity	STEP	Gravity	STEP	Gravity	STEP	Gravity	STEP	Gravity	STEP
Oxidation Ditches	$19.1M	$16.0M	Included	Included	$3.5M	$3.5M	$22.6M	$19.5M	8	8
BIOLAC	$16.4M	$13.7M	Included	Included	$3.5M	$3.5M	$19.9M	$17.2M	10	8
Facultative Ponds	$14.2M	$13.1M	$2.4M(2) +2.2M . $4.6M .	$2.4M(2) +2.2M . $4.6M .	$4.0M	$4.0M	$22.8M	$21.7M	20 (4)	20 (4)
MBR – Tri-W	$55.0M	NA	Included	NA	Included	NA	$55.0M	NA	4	NA

O&M COSTS

Treatment Technology	Annual Treatment O&M Cost		Nitrification/ Denitrification (5)		Tertiary Treatment(3)		Annual O & M Level 2 Treatment		Energy Requirements (Kilowatt hours/ year)	
	Gravity	STEP	Gravity	STEP	Gravity	STEP	Gravity	STEP	Gravity	STEP
Oxidation Ditches	$690,000	$570,000	Included	Included	$ 30,000- $100,000.	$ 30,000- $100,000.	$720,000- $790,000	$600,000- $670,000	900,000	800,000
BIOLAC	$700,000	$550,000	Included	Included	$ 30,000- $100,000.	$ 30,000- $100,000.	$730,000- $800,000	$580,000- $650,000	1,100,000	800,000
Facultative Ponds	$510,000	$510,000	$35,000(5) +90,000 . $125,000 .	$35,000(5) +90,000 . $125,000 .	$ 60,000- $130,000.	$ 60,000- $130,000.	$695,000- $765,000	$695,000- $765,000	600,000	600,000
MBR – Tri-W	$700,000	NA	Included	NA	Included	NA	$700,000	NA	***Numbers needed***	NA

(1) Assumes Denitrification only needed for Broderson Leachfield sized for 0.8 MGD side stream at peak winter flow.
(2) Requires Nitrification to convert Ammonia to Nitrate before Denitrification Process
(3) Assumes full 1.4M flow treated to tertiary level for agriculture, urban reuse, and future regulations.
(4) Ponds may only be possible on the Giacomazzi site.
(5) O&M costs Assume 0.4MGD average Denitrification side stream flow.

NOTE: Report uses 1.4mgd in all final cost calculations. STEP should be based on 1.2mgd.

Technical Advisory Committee
Engineering and Water Resources Subcommittee
Project Pro/Con Analysis
Treatment Systems

Criteria	Treatment Method	Pro	Con
Flexibility of treatment process to meet future needs and regulations	BIOLAC STEP	Proven to reduce BOD Relatively small footprint, at 8 acres Can add tertiary treatment at end of treatment train. Also, advanced oxidation and membrane treatment can be added as well following tertiary treatment.	37 mg/l nitrogen
	BIOLAC Gravity	Proven to reduce nitrogen levels to less than 10 mg/l Proven to reduce BOD Relatively small footprint, at 10 acre Can add tertiary treatment at end of treatment train. Also, advanced oxidation and membrane treatment	

Criteria	Treatment Method	Pro	Con
		can be added as well following tertiary treatment.	
	Oxidation Ditch STEP	Proven to reduce BOD Relatively small footprint, at 8 acre Can add tertiary treatment at end of treatment train. Also, advanced oxidation and membrane treatment can be added as well following tertiary treatment.	39 mg/l nitrogen
	Oxidation Ditch Gravity	Proven to reduce nitrogen levels to less than 10 mg/l Proven to reduce BOD Relatively small footprint, at 8 acre Can add tertiary treatment at end of treatment train. Also, advanced oxidation and membrane treatment can be added as well following tertiary treatment.	
	Partially Mixed Facultative Ponds	Proven to reduce BOD	54 mg/l nitrogen

Criteria	Treatment Method	Pro	Con
	STEP	Can add tertiary treatment at end of treatment train. Also, advanced oxidation and membrane treatment can be added as well following tertiary treatment.	
	Partially Mixed Facultative Ponds Gravity	Proven to reduce BOD Can add tertiary treatment at end of treatment train. Also, advanced oxidation and membrane treatment can be added as well following tertiary treatment.	15 mg/l Nitrogen Large acreage requirement (20) may limit flexibility in terms of adding additional treatment unit due to space limitation of plant site.
	Tri-W	High quality effluent	Small acreage available (11)
Demonstrated reliability of process	BIOLAC STEP	Proven history Maintenance is lower than with gravity	Additional Nitrate treatment required
	BIOLAC		

Criteria	Treatment Method	Pro	Con
	Gravity	Proven history	
	Oxidation Ditch STEP	Proven history	Additional Nitrate treatment required
	Oxidation Ditch Gravity	Proven history	
	Partially Mixed Facultative Ponds STEP	Proven history	Additional Nitrate treatment required
	Partially Mixed Facultative Ponds Gravity	Proven history	Additional Nitrate treatment required
	Tri-W	Proven history	
Effect of process on bio-solids production	BIOLAC STEP	Reduce volume of sludge	
	BIOLAC Gravity	30 – 70 day SRT	Frequency of sludge removal
	Oxidation Ditch STEP	Reduce volume of sludge 10 – 30 day SRT	
	Oxidation Ditch Gravity	15 – 30 day SRT	Frequency of sludge removal

Criteria	Treatment Method	Pro	Con
	Partially Mixed Facultative Ponds STEP	Reduce volume of sludge Less frequency of sludge handling	
	Partially Mixed Facultative Ponds Gravity	Reduce volume of sludge Less frequency of sludge handling Very long SRT, sludge production much less than suspended activated sludge systems	
	Tri-W		Frequency of sludge removal
Construction cost, replacement, operation and maintenance Note: used highest number from Table 4.19	BIOLAC STEP	$20.8 mil $900,000	
	BIOLAC Gravity	$19.9 mil $800,000	
	Oxidation Ditch STEP	$23.1 mil $920,000	

Criteria	Treatment Method	Pro	Con
	Oxidation Ditch Gravity	$22.6 mil $790,000	
	Partially Mixed Facultative Ponds STEP	$20.7 mil $890,000	
	Partially Mixed Facultative Ponds Gravity	$25.6 mil $900,000	
	MBR		$55 mil
Energy	BIOLAC STEP	$100,00	
	BIOLAC Gravity	$130,000	
	Oxidation Ditch STEP	$100,000	
	Oxidation Ditch Gravity	$110,000	
	Partially Mixed Facultative Ponds STEP	$70,000	

Criteria	Treatment Method	Pro	Con
	Partially Mixed Facultative Ponds Gravity	$70,000	
	MBR		Highest

abarrow

From: "albarrow" <abarrow@sbcglobal.net>
To: "Karen McBride" <karenm@rcac.org>
Cc: <abarrow@sbcglobal.net>
Sent: Tuesday, December 06, 2005 7:24 PM
Subject: Fw: Governor Signs CCRH's SB 1087

Hello Karen;
John recomended you visit Los Osos for an evaluation. If you like I will forward the 1994 USEPA evaluation by Jim Kreissl and his team. Check out my websites and the LOCSD for quick information. www.losososcsd.org/
Thank You,
Al Barrow C.A.S.E.

----- Original Message -----
From: albarrow
To: john weidemaier
Cc: abarrow@sbcglobal.net
Sent: Tuesday, December 06, 2005 3:11 PM
Subject: Fw: Governor Signs CCRH's SB 1087

Hello John;
Good talking with you about Los Osos financing. Here is the infrastructure law for low and moderate housing services. Look forward to some loan information.
Thank You,
Al Barrow C.A.S.E. www.clih.org & www.case-environmental.org

Subject: FW: Governor Signs CCRH's SB 1087

MEMORANDUM

DATE: October 10, 2005

TO: CCRH Board of Directors
FROM: Rob Wiener
RE: Governor Signs SB 1087

Late Friday, October 7, the Governor signed CCRH's SB 1087, one of the final bills remaining on his desk. Word is that the bill was a "tough one" and the decision to sign was made at the last minute.

The bill requires that water and sewer districts must now prepare a written policy no later than July 1, 2006, concerning how they will grant a priority for provision of services to low- and moderate-income housing, as mandated (but rarely implemented) under Section 65589.7 of the Government Code. Moreover, they can only deny a request for services by making findings under certain narrow exceptions, e.g., when there is a water/sewer emergency or lack of capacity as demonstrated in an engineering report.

SB 1087 was negotiated in close consulation with representatives of the main water and sewer district associations, Association of California Water Agencies and California Association of Sanitation Agencies, and with the California Building Industry Association, which ultimately urged the Governor to sign the bill.

During the negotiations, some expressed misgivings about whether the ambiguities in current law might actually better serve the goal of compelling districts to provide services under the threat of legal action. Hopefully, the new law will not undermine that threat and, instead, create greater transparency, certainty, and fairness in the delivery of water and sewer services, thereby, reducing the problems faced by CCRH members in rural districts around the state.

Thanks are due to many who contributed toward passage of SB 1087: Senator Dean Florez and Rudy Salas, his legislative aide, who adeptly managed the bill; Lenny Goldberg, whose tireless advocacy made passage possible; representatives of the CBIA, ACWA, and CASA who helped craft the bill and remove their organizations' initial opposition; Tom Collishaw and Michael Lane, Self-Help Enterprises, Chris Glaudel and Greg Sparks, Mercy Housing California, Mike Rawson, California Housing Law Project, David Grabill, private attorney, and others who advised on the bill and testified at hearings.

http://www.governor.ca.gov/state/govsite/gov_htmldisplay.jsp?BV_SessionID=@@@@0979031792.1128957749@@@@&BV_EngineID=cccgaddflkfimeccfngcfkmdffidfnf.0&sCatTitle=Press+Release&sFilePath=/govsite/press_releas
2f07%2f2005&iOID=72140

As I mentioned in my earlier email, I recognize you have a great deal to do. To the extent you think we can be helpful, please stay in touch, tom

---

Tom Lockard
Managing Director
Stone & Youngberg LLC

One Ferry Building
San Francisco, CA 94111
(415) 445-2325 tel
(415) 445-2395 fax
tlockard@syllc.com
www.syllc.com

-----Original Message-----
From: albarrow [mailto:abarrow@sbcglobal.net]
Sent: Thursday, November 17, 2005 12:37 PM
To: Tom Lockard
Cc: Daniel Bleskey; abarrow@sbcglobal.net
Subject: This compares the SRF with the effluent system

Hello Tom;

Thank you for your valuable time this morning. The estimate of $66.00 a month to pay $50 million over 20 years is an interesting number. It is early, but our staff and board needs to know what costs for money thay will be considering. As promised all communications will be go to the LOCSD Interim General Manager Daniel Blesky of Wildan.

Thank You,
Al Barrow C.A.S.E.

abarrow

From: "albarrow" <abarrow@sbcglobal.net>
To: "bryan miller" <bryan@muni.com>
Cc: <abarrow@sbcglobal.net>
Sent: Thursday, November 17, 2005 4:39 PM
Subject: Fw: This compares the SRF with the effluent system

----- Original Message -----
From: albarrow
To: RobM@jlwa.com ; bryann miller ; julie biggs ; Onstot, Stephen R. ; Murphy, Gregory M.
Cc: birgie1326@sbcglobal.net ; Julie Tacker ; abarrow@sbcglobal.net ; lisaschicker@charter.net ; Gail McPherson ; Keith Swanson
Sent: Thursday, November 17, 2005 3:36 PM
Subject: Fw: This compares the SRF with the effluent system

Hello;
Here is my answer from Tom. Does Muni or Wallace have any other financial tools say maybe some short term loan money for design & land secured with Tri-W (10.5acres) or Broderson (80 acres).with no vote needed. Or some other creative steps to get the district on the road to a sewer now? Maybe an insurance or pension fund or like financial institution . Maybe deflexing some fines too.
Thank You,
Al Barrow C.A.S.E.

----- Original Message -----
From: Tom Lockard
To: albarrow
Cc: Daniel Bleskey
Sent: Thursday, November 17, 2005 2:54 PM
Subject: RE: This compares the SRF with the effluent system

Al, I've looked over the attachment you sent to me. The message in your attachment is that $135 million is much less than $50 million; even if the cost of borrowing the $50 million is much higher. To put it another way, the interest rate on the $50 million borrowing would have to go up to around 12.50% to begin to make the smaller borrowing less economical.

I tend to look more closely at what each household would pay as well as make the calculations using a 30 year term. (It makes economic sense to match the term of the borrowing to the useful life of the improvements. In this way constituents pay for the improvements as they are being used over time rather than socking today's users for infrastructure that will benefit future generations.) To run through the calculation of $66/month/edu, I calculated the approximate annual principal and interest payment for a $50 million borrowing, which would net the CSD about $45 million after funding an investor reserve and paying costs. I assumed a 30 year term at 6.50%: annual payment of about $3.8 million. Assuming 4,800 edu's in the CSD means that each edu would pay about $800 per year or $66 per month. This is a steep increase for a community with a median income of about $45,000 -- it would be steep for just about any community for that matter! This fee ignores operation and maintenance costs. At the same time, there aren't many alternatives and sewer services -- fixed and variable -- need to be paid.

To the extent the CSD wanted to engineer another 1913/1915 Act special benefit assessment district, we would be interested in talking. At the same time, we would also be willing to discuss an installment sale revenue pledge style financing.

ESTIMATES:
Directional Drill with Restoration:

PIPE SIZE	SECTION A	B&C	D&E	QUANITY	PRICE	TOTAL
1.25	60611	35755	41790	138156	$20.00	$2,763,120.00
1.5	2743	12576	3515	18834	$20.00	$376,680.00
2	1970	9360	4005	15335	$20.00	$306,700.00
2.5	2633	7555	2977	13165	$20.00	$263,300.00
3	5925	2630	5150	13705	$22.50	$308,362.50
4	8894	3290	3040	15224	$22.50	$342,540.00
6	5616	4090	2315	12021	$32.25	$387,677.25
8	662	1850	2030	4542	$36.50	$165,783.00
10	680		705	1385	$46.40	$64,264.00
12	1115		600	1715	$51.30	$87,979.50
						$5,066,406.25
LATERALS						
1.5				390000	$18.50	$7,215,000.00
TOTAL						**$12,281,406.25**

ESTIMATES:
Directional Drill with Restoration:

PIPE SIZE	SECTION A	B&C	D&E	QUANITY	PRICE	TOTAL
1.25	60611	35755	41790	138156	$20.00	$2,763,120.00
1.5	2743	12576	3515	18834	$20.00	$376,680.00
2	1970	9360	4005	15335	$20.00	$306,700.00
2.5	2633	7555	2977	13165	$20.00	$263,300.00
3	5925	2630	5150	13705	$22.50	$308,362.50
4	8894	3290	3040	15224	$22.50	$342,540.00
6	5616	4090	2315	12021	$32.25	$387,677.25
8	662	1850	2030	4542	$36.50	$165,783.00
10	680		705	1385	$46.40	$64,264.00
12	1115		600	1715	$51.30	$87,979.50
						$5,066,406.25
LATERALS						
1.5				390000	$18.50	$7,215,000.00
TOTAL						**$12,281,406.25**

abarrow

From: "abarrow" <abarrow@sbcglobal,net>
To: <birgie1326@sbcglobal.net>
Cc: "al barrow" <abarrow@sbcglobal.net>
Sent: Friday, April 27, 2007 4:53 PM
Subject: Fw: Emailing: stepsystems

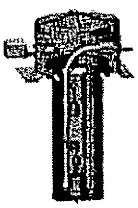
One more
----- Original Message -----
From: abarrow@sbcglobal.net
To: Ron Mcpherson
Cc: abarrow@sbcglobal.net
Sent: Wednesday, July 07, 2004 8:12 PM
Subject: Emailing: stepsystems

Hi Gail;
Here is a cheaper line of septic tank effluent pumping hardware.
Al Barrow C.A.S.E.

Zabel Online Store

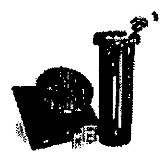
Zabel Online Store Main Page | Search | Index | Show Order | Catalog | Info | Privacy | MainPage

STEP Systems



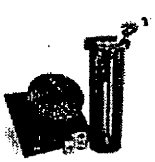
Zabel Septic Tank Effluent Pumping (STEP) Systems come with all necessary components to install your pumping system. Available in 7 ready to ship packages, each STEP Package is designed for ease of installation and maintenance. All pumps included in STEP Packages carry a three-year warranty. Send us your design and we will provide a custom quote. * For a custom quote call toll free 1-800-221-5742

STEP System Quotation Forms



ZS-100

STEP System Package List price: $976.95 Sale price: **$777.00**
Add to cart



ZS-110

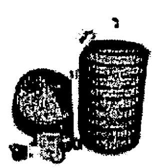
STEP System Package List price: $1,354.95 Sale price: **$1,068.00**
Add to cart

ZS-200

STEP System Package List price: $1,549.95 Sale price: **$1,213.00**
Pump: Options Add to cart

ZS-300

STEP System Package List price: $667.95 Sale price: **$619.00**
Add to cart

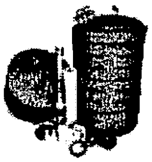


ZS-310

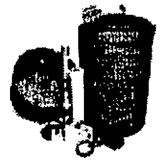
STEP System Package List price: $998.95 Sale price: **$783.00**
Add to cart

ZS-400

ZS-410



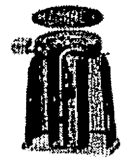
STEP System Package List price: $1,375.95 Sale price: **$1,055.00**
Pump: Options Add to cart



STEP System Package List price: $1,571.95 Sale price: **$1,219.00**
Add to cart

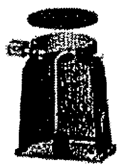
Effluent Pump Package

ZS-125/250/400/650-EPP



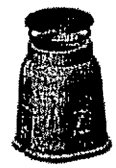
Turbine Pump Package

ZS-125/250/400/650-TPP



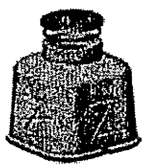
Sewage Pump Package

ZS-125/250/400/650-SPP



TS-FPT-125

125 Gallon Fiberglass Pump Tank List price: $700.95 Sale price: **$600.00**
Add to cart

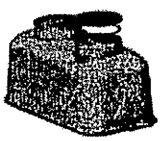


TS-FPT-250

250 Gallon Fiberglass Pump Tank List price: $850.95 Sale price: **$750.00**
Add to cart

TS-FPT-400

400 Gallon Fiberglass Pump Tank List price: $1,050.95 Sale price: **$950.00**
Add to cart



TS-FPT-650

650 Gallon Fiberglass Pump Tank List price: $1,450.00 Sale price: **$13,550.00**
Add to cart

abarrow

From: "abarrow" <abarrow@sbcglobal,net>
To: "bruce gibson" <bruce@brucegibsonforsupervisor.org>; <bcuddy@thetribunenews.com>; "Andrew Christie" <santa.lucia.chapter@sierraclub.org>; "Spenser Harris" <timothycleath@sbcglobal.net>; <LOWWP@co.slo.ca.us>; "Rob Miller" <RobM@wallacegroup.us>; <birgie1326@sbcglobal.net>; "Brady, John" <JohnBrady@scwater.com>; "ed ochs" <edochs@charter.net>; "Keith Swanson" <swandiego@hotmail.com>; <baywoodrealty@charter.net>; <pogren@co.slo.ca.us>; "lou carella" <lcarella@carollo.com>; "chuck cesena" <ccesena@losososcsd.org>
Cc: "david edge" <mageedge@msn.com>; "David" <david@daleoinc.com>; "Bill" <bill.garfinkel@sbcglobal.net>; "ann calhoun" <churadogs@aol,com>; "alon perlman" <alonatwork@email.com>; <windmilljt@sbcglobal.net>; <Vcathie@aol.com>; <SDUERR@TRIBUNENEWS.COM>; "sarah christie" <sarahcreston@earthlink.net>; "sandra hedges" <skhedges@sbcglobal.net>; "Ryan Vance" <rvance@mve.net>; "'Rob Shipe'" <robs@2xtreme.net>; "R. Glenn Stillman" <g.stillman@verizon.net>; <peggypavek@yahoo.com>; <Patrick@rain.org>; <patricia.renshaw@sbcglobal.net>; "patricia johanson" <patriciajohanson@aol.com>; "Parker/Hawley" <parker@parkerandhawley.com>; "pam ochs" <pamochs55@yahoo.com>; "Pam Heatherington" <pheatherington@charter.net>; "Orval Osborne - Creek Labs" <orval@creeklabs.com>; <mwulkan@co.slo.ca.us>; "Mike Tutt" <tutcoinc@charter.net>; <Mikesylv@aol.com>; <MJHJ2020@aol.com>; "al barrow" <abarrow@sbcglobal.net>; <mshunter@charter.net>; <truehr@calpoly.edu>; "LeighEnt@aol.com" <LeighEnt@netscape.com>; <ladyart1@earthlink.net>; <mariakelly@charter.net>; <kelly@baileymed.com>; <ghostmom@MSN.com>; <cmcbride@tenera.com>; <ERose201@aol.com>; <environmental911@sierraclub.org>; "David Jeffries" <dwjeff@charter.net>; "Duncan and Marlene McQueen" <dmmcqueen@charter.net>; <dmccune@a-fi.com>; "DAVE CHIPPING" <dchippin@calpoly.edu>; <CNUTTY@SLONET.ORG>; <clp17@bigplanet.com>; "Chris Kubiak" <ckub@netzero.net>; "chris_kofron@rl.fws.gov" <chris.kofron@fws.gov>; "Bill Vedrin" <bvedrin@charter.net>; "Lois/Frsnk Wasley" <brznctz@aol.com>; <birgie1326@sbcglobal.net>; <Beachs96@aol.com>; <BDifatta@aol.com>; "Barbara Carlock" <barbara@carlocksbakery.com>; "Athena Stairs" <ASTAIRS@charter.net>; "aprado@thetribunenew.com" <aprado@thetribunenews.com>; "abe perlstein" <ap3dguy@hotmail.com>; "Mark Skinner" <MarkS@special-places.org>; <NOV100@JUNO.COM>; "Phyliss Caruthers" <Rcaruthe@fix.net>; "Rachel" <rachel@peopleforpeople.com>; "Michael Miller" <vmmil@charter.net>; "Peter Douglas" <pdouglas@coastal.ca.gov>; "Diane Landry" <dlandry@coastal.ca.gov>; "Charles Lester Ph.D." <clester@coastal.ca.gov>; <smonowitz@coastal.ca.gov>; <KSouza1@dhs.ca.gov>; <jkreissl1@insightbb.com>; "George Tchobanoglous" <GTCHOBANOGLOUS@UCDAVIS.EDU>; <governor@governor.ca.gov>; <derekl@coastal.ca.gov>; "Abel Maldanado" <assemblymenber.maldonado@assembly.ca.gov>; "art baggett" <abaggett@exec.swrcb.ca.gov>; <rbriggs@swrcb.ca.gov>; <smarks@rb3.swrcb.ca.gov>; "Spenser Harris" <timothycleath@sbcglobal.net>; "Warren Morgan" <wwmorgan@scwater.com>
Sent: Friday, April 27, 2007 5:50 PM
Attach: Fw_ Bid tabs - STEP sewer projects_.eml
Subject: STEP COLLECTION INACURACIES: Fw: PIPE QUANTIES

To; Paavo Ogren SLO County
Deputy Director Public Works
LOWWP, Project Manager;

Dear Mr. Ogren

These STEP collection numbers include pothole and paving to the outof town sites.
Add $1.75 million for laterals.
Add $3.169 million for piping in street.
Add $21.6 million on lot cost the onsite pumping package

Give $10 million for new tanks @$2000.00 (MWH says $4000.00)
Add $8.1 million for ponds
That is around $44.6 million for collection and treatment. Which makes $79.2 for STEP (only) collection number from Montgomery Watson Harza's number in Table 3-11 Cost Comparison of Collection Alternatives page 3-14 (1-17-2001) look like constructive fraud in the 2001 Project Report.

In Table 8-1 of the Draft EIR Comparison of Alternative Collection Systems STEP/STEG was considered the environmentally preferred although it says incorrectly STEP will have a greater life cycle cost. (STEP designers and managers have not found that to prove out). While there is room for some argument the numbers like the 46% over bid of the MWH Engineer's estimate seem to substantiate a thread of inacurracy throughout the Project Report (March 7, 2001), FEIR (March 1, 2001), Engineer's Design, Value Engineering and bid assumptions. All this would seem to justifies a forensic analysis. The whole project is based on the Project report which numbers seemed skewed when compared to STEP industry's historical cost. I am attaching a very recent bid set from a STEP that was part of the Rough Screening by Carollo engineering. Also there was no credit given for the primary treatment Septic Tanks provide which eases the treatment burden (cost in dollars and energy). Whatever values you use should be verified by recent STEP collection project such as the attached bid tabs for Charlotte County Florida. Both Tidwell and Daleo provided estimated for the Los Osos STEP collection. Pentair Pumps has also provided pressure curve design for the STEP collection based on MWH collection drawings. Orenco has also provided estimates including treatment and BOOT financing.

Chapter 3 in the Project Report makes assumptions and conclusions that do not match industry standards, the Project update or the Peer review. Even though the RWQCB3 timeline rushed the process I do not see justification for the results. One must remember the goal of the project was to stop the discharge into the groudwater basin not build a glorius monument to modern engineering. The Los Osos Technical Task Force found flaws as well as the SLO County added 83 conditions as did the Coastal Commission in granting a DeNovo hearing. The site, the technology and the O&M made the project out of sinc with the California core value of sustainability.
It is difficult to imagine the values MWH has assigned to STEP or the assumptions Crawford, Multari and Clark gave them as lying anywhere but beyond conservative. Page 102-104 leave out the table in the draft but screens out the STEP as the life cycle cost is greater than Gravity. This work cost us over $10 million dollars in soft costs. MWH should have had these numbers and sources. (To date the LOCSD has spent $29 million on the sewer. The County has spent $5 million and budgeted another $5 million. In a community where area incomes ranged from $33 million to medium incomes in the Sewered zone, affordability seems slighted, although the STEP was tossed for lack of affordability.

The Project Update in 2005 supported the lower numbers. If MWH had cared to look the STEP nubers could easily have been located by a web search using STEP. Carollo had no problem finding seven examples of working systems in the Rough screening

and unlike MWH did not screen out STEP as a viable alternative. In addition the peer review by NWRI affirmed the Project Update.

Now that you have completed the Fine Screening and the Technical Advisory Committee is into the Pro Con analysis, it is important to consider some of the issues I raised with the Coastal Commission. How you could finish the Fine screening without the input off the above professionals is a mystery. Orenco still sticks to the estimates in their PPT presentation at the LOCSD October 19, 2006 board meeting of $40-$50 million dollar range. With the sunk cost even that will be a burden on half the community. The reports I have referred to are on your website. Please distribute this submittal to the TAC members, Carollo and your staff.
Thank You,
Al Barrow, President, Citizens for Affordable and Safe Environment & Coalition for Low Income Housing **www.case-environmental.org** **www.clih.org**

> ----- Original Message -----
> **From:**
> **Sent:** 6/28/2004 1:12:55 AM
> **Subject:** Fw: PIPE QUANTIES
>
> Charles Lester
> Deputy Director
> Peter Douglas
> Executive Director of the California Coastal Commission
>
> Dear Charles Lester;
>
> Regarding the STEP collection viability as the least environmentally impactive and the far cheaper option here is truer cost numbers than the LOCSD Wastewater Project Report by Montgomery Watson Harza.These directional boring numbers for STEP Collection include piping, potholing and repaving by Tidwell Excavating of Paso Robles Ca SLO County. The Project reported as high as $79 Million dolars Total without laterals is $3,169,000.00. I asked for 5774 onsite laterals cost added at a 4'depth so as to be under the water pipe system as the District Engineer Rob Miller says is necessary. This is in conflict with the Project report number presented to the citizens of Los Osos and in the final EIR without . This may be construed as technical fraud as it is the basis of the project..
> Under Collection Sysytem Alternatives page 102 of the FEIR it states the septic tanks remove 90% of the grease, 70-90% of the suspended solids and 50-80% of the Biochenical oxygen demand for FREE. No dewatering, lower erosion impact, no trench stabilization required, less disturbance of Cultural resources, less traffic disruption, less noise, truck traffic, air pollution and less impagt on biological resources.. The alternative was rejected on false premis. Septic only have to be pumped every 10-12 years (see Orenco.com). Septage hauling would be less than classless sludge hauling to Santa Maria and no gaurantee it will be acceptable their.Septic have several days storage capacity. Leech fields are completey abandoned , the only limitation to property use is a very small area.. STEP Collection does not have a higher life cycle cost. The enginer from Nelson Environmental has had to purchase omly a hose clamp and the electrical is one dollar a month for the pump.
> Page 104 states the ponds require algae treatment and a large footprint and would use more land and be more impactiv eto native plants. There is no ESHA (native plants) East of Los Osos Creek so no impact will occur there. While it is true Algae based ponds require photosytesis and are shallow and have a large foot print the district had a bacteria based pond they could have used East of town which now has a 14 acre footprint (mentioned earlier).Again the FEIR left out 8 usable acres on the Andre site.
>
> The Nelson Environmental Treatment lagoons are $8,178,125.00. The onsite is around $10,000,000.00

for top of the line Orenco hardware biofilter baskets, pumps, risers, flanges, electrical and GIS telephone monitoring. Add 15% contingency $475,350.00 and 10% engineering $316,000 and $1,500,000.00 land cost for a total of $23,638,475.00. If only the STEP is considered we a at under $14 Million
No Sludge trucking to Santa Barbara County is required with the Lagoon which 87% of the electorate voted for overwhelmingly in November 1998. Bait and Switch! No Dewatering Wells for trenching gravity lines. No Harvest Wells. No dumping in the Bay. No sewer needed downtown on ESHA. No Reverse Osmosis and Brine hauling to Ventura County, Saves $100 Million and the 16 acres of ESHA. Most protective of water supply and environment on balance. Please add this to C.A.S.E. Appeal record. This covers treatment and Collellection with no sludge and is still a lower cost (see Table 4.4 of the project report) for STEP/STEG collection. Please look carefully at the LOCSD numbers. We have no electrical cost from them. What is O&M? They made the decision to pump into the Bay the last board meeting. What is the treatment method and cost? STEP collection is viable under $15 Million and more protective of Coastal resources as is the location East of town. The LOCSD project touted at $92 Million capital cost without onsite property expense. It uses vastly more electricity than the STEP Method. It digs up all the roadways. It has 750 manholes and 7 lift station. It desroys 16 ESHA and other Coastal resources which STEP is more protective of especially with out of town location.
We also strongly object to the LOCSD's omission (June 18, 2004).of of the 8 acres of Andre site that is not under an easement agreement fo the power lines and no negotiations were attempted to use a portion of the 32 acres which all are not under the power lines Since the plant is running at full capacity it is doubtful a third set of lines will be needed. Further the need to get 80,000 lbs vehicles in can easily be accomodated from the West side of the property. In addition the District Engineer has a number of close by sites that are appropriate. Item Number one of Charles Lester's letter was not done. Further the current SLO LCP states a completed HCP is necessary before Coastal Development Permit application may be submitted.
The wetland issue is being denied by the LOCSD. I will attach a letter from USACE that considers this a violation of 404 and is a wetlands.
In addition the application rate at Broderson is an unacceptable rate of 130 feet a year. The fate fo the effluent is in quaestion for two reasons
1. Clay lenses exist in the soil that run horizontally resisting vertical flows.
2. The discovery of a large clay lens extending over the inferred fault will cause the effluent to run in an unanticipated direction... new finding. Cal Cities wells will be impacted contaminating drinking water wells.
Harvest well blending with lower aquifer water will require treatment that is yet to be qualified and quantifies in terms of method, cost and volume. The groundwater study results for saltwater intrusion (DWR Grant $240,000.00) will not be available for 11 months.
The HCP was not circulated on time and we do not know what is in it. LOCAC has decided to write a letter objecting to the HCP Draft which has been reviewed by the public nor the USFWS..
Thank You,
Al Barrow C.A.S.E.
----- Original Message -----
From:
Sent: Monday, June 21, 2004 6:15 AM
Subject: Re: PIPE QUANTIES

> ----- Original Message -----
> **From:**
> **Sent:** Wednesday, June 09, 2004 2:53 AM
> **Subject:** Fw: PIPE QUANTIES
>
> Hi Travis;
> e-mail if you need more information.
> Thank You,
>
> Al BARROW CITIZENS FOR AFFORDABLE AND SAFE ENVIRONMENT&COALITION FOR LOW INCOME HOUSING
> ----- Original Message -----
> **From:**
> **Sent:** Tuesday, June 08, 2004 8:59 PM

Subject: Fw: PIPE QUANTIES

Hello Leo;
Here are the pipe numbers in linear feet. Rob Miller our District engineer Wallace Group, says around 4 feet deep so we are below water lines ar 3' is a depth to shoot for. We would like a preliminary estimate. As I recall you were between $9 and $12 a foot.
Thank You,

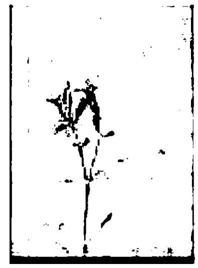
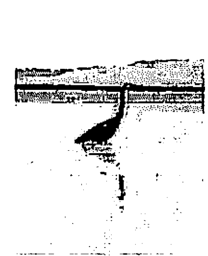
Al BARROW CITIZENS FOR AFFORDABLE AND SAFE ENVIRONMENT----- Original Message -----

From:
Sent: Tuesday, June 08, 2004 7:22 PM
Subject: PIPE QUANTIES

FOLLOWING ARE ESTIMATED PIPING QUANTIES FOR THE COLLECTION SYSTEM BASED ON OSWALD 2000 ADJUSTED TO INCLUDE THE ENTIRE PROHIBITION ZONE.

3 INCH PIPE		135,000	LINEAL FEET	$10-12 per/ft
4	"	16,000	"	$11-13 per/ft
6	"	16,000	"	$17-19 per/ft
8	"	25,000	"	$24-30 per/ft
10	"	5,000	"	$33-38 per/ft
12	"	7,000	"	$43-50 per/ft
	TOTAL	204,000	"	

Al,
These prices should get you in the ball park. Let me know if you need anything else.
Thank You,
Travis Wollerman


DRAFT

Pond-Based Secondary & Tertiary Wastewater System Proposal Page 2 of 14 copyright © Nelson Environmental Inc,

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1. Introduction to Nelson Environmental Inc.

The function of Nelson Environmental Inc. is to provide turn-key long term cost effective, ecologically friendly water and wastewater treatment through: technology design and construction system leasing and financing options

Project applications include:

· Industrial wastewater and Storm water ponds

o Food processing

o Mining

o Petrochemical

o Pulp and paper

o Dairy

· Municipal wastewater lagoons

· Lakes and reservoirs

Projects have been successfully completed and are currently ongoing in Canada, USA, Mexico and the Middle East.

Our water and wastewater treatment methodology is to develop systems that:

· are long term cost effective

· simple in design and construction

· are ecologically friendly

· **maximize the use of existing infrastructure**

2. Project Overview

How to provide cost effective, sustainable wastewater treatment for the City of Los Osos,

California has been the subject of discussion for many years. Various technologies ranging

from natural shallow pond based systems to high tech mechanical plants have been considered.

Either due to technical limitations or excessive cost none of the options considered to date have

been embraced or accepted concurrently by either the citizens or the technical review teams.

Currently the city utilizes a septic tank and pump-out system. The intent is to implement some

form of permanent collection system and pipe the wastewater to the proposed treatment facility

site.

Nelson Environmental Inc.'s approach to treating wastewater is to maximize the use and operational simplicity of a pond system but integrate high performance technologies within the ponds to ensure optimal treatment efficiency.

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Pond-Based Secondary & Tertiary

Wastewater System Proposal Page 3 of 14 copyright © Nelson Environmental Inc, 2004

3.0 General Treatment Process Discussion

The general concept of the proposed WWTP is a multi stage aerated lagoon with allowance for septage receiving, attached growth biofiltration, final filtration and treated effluent disinfection.

Multistage pond systems are used extensively for both municipal and industrial wastewater treatment for some of the following reasons:

· Excellent ability to handle large fluctuations and peaks in organic loads and flows without biological upset or loss in treatment performance or performance problems. Internal aerobic and anaerobic sludge digestion results in minimal long-term sludge handling costs.

· Minimal energy consumption and operating costs.

· Minimal chemical usage.

· Low degree of operation complexity results in minimal operation costs and maximum

reliability.

In order to meet the required final effluent quality, a combination of technologies in conjunction

with the multistage ponds are proposed.

Primary treatment would include:

· Truck-haul receiving station for septage including primary screens.

The technologies for secondary treatment addressed in this proposal are:

· MixAir Technologies (MAT) fine bubble aeration system

· AquaMats® attached growth biofiltration system

· Partial lagoon cover for odour control in anoxic denitrification cells and algae (TSS) control in tertiary treatment ponds.

In order to meet the tertiary effluent requirements the following technologies would be implemented:

· Continuous upflow gravity sand filters for final solids removal and denitrification

· Low pressure-high intensity UV disinfection system for pathogenic bacteria destruction.

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Pond-Based Secondary & Tertiary

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4.0 Water Quality Requirements

Preliminary influent and effluent water quality parameters provided to Nelson Environmental for the purpose of this preliminary design include:

Wastewater Characteristics Influent Effluent

Dry Weather Flow mgd 1.4

Wet Weather Flow mgd 1.6

CBOD mg/l 133 <15*

TSS mg/l 30 <15*

Influent TN mg/l 40-60 <7 average <10 peak

Minimum water temperature C 16

*** assumed since no parameters were provided**

All influent and effluent water quality parameters will require verification prior to final design.

5.0 Primary Treatment System

A septage receiving station would be required at the lagoon site for truck-haul septage and

holding tank wastewater. Preliminary design is based on 3 loads per week.

A JWC Environmental "Honey Monster" septage receiving system or equivalent would be used.

The receiving station would allow cleaner handling of septage truck waste through separation of solids. The unique combination of grinding, washing and dewatering septage waste can be accomplished in approximately 5 to 15 minutes for a typical septage truck. An optional metering and billing control system is available for monitoring septage flow and providing accurate billing information to septage haulers and the plant. The system is based on a card reader or digital keypad for security, in combination with a flow meter and valve.

6.0 Secondary Treatment System

The primary purpose of the aerated ponds is to provide oxygen and residence and contact time to natural bacteria, which ultimately convert the wastewater contaminates (BOD5, ammonia, and TSS) to carbon dioxide, water, and inert ash and nitrates. Aerated ponds effectively control

odours and provide internal sludge digestion.

The proposed anoxic ponds provide a low oxygen environment, which is used for converting nitrates into inert nitrogen gas. The anoxic ponds are covered with a permeable cover, which prevents ambient oxygen from reaching the surface of the wastewater in addition to preventing

any odorous gasses from being liberated into the atmosphere.

i. Odor Control
ii. **Because all ponds exposed to the atmosphere are aerobic (all anoxic zones are covered), no odours will be produced if the system is operated within the specified design parameters.**

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Pond-Based Secondary & Tertiary

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iii. **BOD5 reduction**

BOD5 is reduced to carbon dioxide, water, and inert ash by natural bacteria, which receive their oxygen supply from air, provided through the aeration diffusers. Because the aeration bubbles not only provide oxygen but also mix the water, the oxygen is evenly distributed throughout the

water body. The small-sized bubbles produced by the air diffusers results in tremendous total surface area per cubic meter of air introduced into the system. This combined with the slow rate of bubble rise contributes to the phenomenal efficiency of the system. Because of low sludge production in the system, retention time is retained for long term BOD5 removal.

iii. Suspended Solids Removal

The diffusers are placed on the bottom of the cells. Through the rise of the bubbles and subsequent mixing, convection cells are created between the diffusers. Not only does the water rise with the bubbles, the solids settle out through the downward motion of the water between the diffusers where the circulation loop is completed. The mixing rate is reduced in the secondary cells to reduce the turbulence and thus facilitate additional suspended solids removal and ammonia reduction.

When the solids reach the bottom of the lagoon, additional oxygen for biodegradation is provided through the diffusers at the cell bottom. This process results in minimal organic bottom sludge accumulation. The environmental impact and cost of sludge removal and disposal can

be minimized with this system. The continuous mixing results in significantly lower algae production than conventional passive

wastewater stabilization lagoons. The oxygen introduced into the system channels nutrients to microorganisms instead of algae. Lower algae production results in lower suspended solids in system effluent. The Nelson Environmental system design does not rely on algae or natural surface aeration for providing oxygen to the wastewater.

iv. Sludge Reduction

A multistage aerated lagoon combines the attributes of wastewater treatment plant, and an aerobic and anaerobic sludge digester. Anaerobic sludge digestion takes place within the bottom sludge layer. Aerobic digestion takes place within the aerated cells at the sludge water interface.

Due to the long system retention time and minimal TSS concentrations in the wastewater influent (30 mg/l), pond desludging frequency should be no more than once every 20 years.

v. Ammonia Removal Process

Currently there are seven full scale applications in operation which include the AquaMats®

attached growth technology presented in this proposal:

Municipal wastewater lagoons include:

· Columbia, Illinois

· Laurelville, Ohio

· Hartford, Iowa

· Larchmont, Georgia

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Pond-Based Secondary & Tertiary

Wastewater System Proposal Page 6 of 14 copyright © Nelson Environmental Inc, 2004

· Eureka, Missouri

Agricultural lagoons (hog manure) include:

· Carroll Farms, North Carolina

Landfill leachate lagoons include:

· Frederic County, Virginia

Of the above systems, Columbia, Laurelville, and Hartford and Frederic all have ice-covered conditions during winter with water temperatures at 1 o C or less.

During seasons where water temperatures are greater than 16 C (as specified for Los Osos) the municipal system and land fill systems are producing effluent with less than 1 mg/l ammonia

nitrogen.

Ammonia reduction in aerated ponds is a biological process that is related to the following parameters:

a) Dissolved Oxygen Levels

Nitrifying bacteria require aerobic conditions. A minimum dissolved oxygen concentration of 2 mg/L (preferably 3 mg/L) must be present for the process to occur. The D.O. must be greater than 2 mg/L immediately above the sludge water interface in order to prevent liberation of ammonia from accumulated sludge under anoxic conditions.

b) Surface area

Bacteria require a medium of some form to grow on. High surface area medium allows for higher-density nitrifying bacteria population.

c) Bacteria

In order to convert ammonia (NH3) to nitrite (NO2 -) and ultimately nitrate (NO3 -) (nitrification) sufficient quantities of two bacteria are required, Nitrosomonas **and** Nitrobacter.

d) Alkalinity

The nitrification process reduces pH levels and consumes alkalinity. If order for nitrification to occur, 8.7 mg of alkalinity must be available for each mg/L of ammonia removed. It may be necessary to add a carbonate alkalinity supplement to the pond if during the course of operation if alkalinity levels become the limiting factor for nitrification to occur.

e) Temperature

Nitrification is greatly influenced by temperature. As the temperature increases, the nitrification rate increases. Temperatures greater than 20 o C up to about 35 o C are optimum nitrification conditions. With water temperatures of 16 o C (Los Osos) the nitrification conditions are good.

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f) pH

Nitrification is enhanced at higher pH levels. PH levels of 7.5 to 8.5 are ideal, although nitrifying bacteria can adapt outside of this range.

All of the above conditions exist naturally in a multistage pond treatment system except for adequate surface area. The AquaMats® biofiltration media provide the required surface area for the nitrifying bacteria.

vi. Nitrate Removal Process

After the nitrification process (conversion of ammonia to nitrites then nitrates) a denitrification process is required to convert the nitrates to nitrogen gas, which is then liberated to the atmosphere. Anoxic (limited oxygen) ponds 2 and 4 combined with AquaMats® biofiltration media designed specifically for denitrification will provide the majority of the denitrification.

7.0 Tertiary Treatment System

An up-flow gravity sand filter would be implemented for final denitrification and suspended solids removal. All solids removed from the filter would be discharged back to the primary complete mix aerated lagoon where further sludge digestion would take place.

A low pressure-high intensity UV disinfection system would be used for pathogenic bacteria destruction after the effluent has passed through the sand filter.

8.0 Total Land Requirements

The land requirements for the system are less than 14 acres. It is assumed that the land area is reasonably flat and that the soils are suitable for pond construction.

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v. Aeration Air Supply
vi. Aeration air supply is provided from positive displacement blowers. The system is designed for full redundancy in such

that full standby blowers are available. The blowers are capable of supplying the required airflow during normal operating pressures, and are also capable of running at higher pressures during cleaning/purging procedures. The blowers would be

equipped with sound attenuating enclosures to keep noise levels less than 80 dbA.

vii. AquaMats® Biofiltration Media

AquaMats® for Biofiltration achieve continuous rates of nitrification by providing surfaces designed for biofiltration that extend into the water column. AquaMats® surface area is engineered to specifically provide holdfast surfaces for nitrifying bacteria. Surfaces are ideal for nitrifier colonization due to the average pore size distribution in the range of 5-400 micron. The principal of operation is to generate concentrated biomass and accelerated biological treatment in a dynamic process similar to the activities in attached growth systems such as trickling filters

or rotating biological contactors (RBC). AquaMats® specifically design for denitrification are placed in the anoxic cells. AquaMats® are self-cleaning in that when biomass reaches a certain thickness, the material will

start to slough off of the AquaMats®, constantly being replaced with new biomass growth. The only visible portion of the AquaMats® is the buoyant floatation collar located at the water surface, with the remaining material extending into the water column. The AquaMats® are arranged in arrays, and held in place with a small-diameter stainless steel cable system. A

concrete anchor is placed on the pond bottom at the end of each array and secured to the stainless steel cables.

viii. Insulated Permeable Floating Cover

In order to retain maintain anoxic conditions and to prevent the escape of any odorous gases a

3/4" permeable foam cover would be implemented. The cover has the following properties:

· 3/4" thick cover made from 100% post industrial, cross link, closed cell polyethylene with a bonded UV resistant fabric cover

· 20 year life span

· will not sink into the water <1% 7 day water absorption

· permeable so any rain water will pass through the cover

· secured around the pond perimeter with an anchor trench.

vii. Upflow Gravity Sand Filter

The Centra-flo Model UF is an upflow, gravity filter of the moving bed design that provides a continuous supply of filtered water without the interruptions of backwash cleaning cycles. Influent enters the center of the filter through a feed chamber and flows upward through the media bed. Filtered water is collected at the top of the filter tank. Solids captured in the filter

bed are drawn downward with the sand into the suction of an airlift pump. The turbulent, upward

flow in the airlift provides a scrubbing action that effectively separates the sand and solids

before discharging into the filter washbox. The washbox is a baffled chamber that allows for gravity separation of the cleaned sand and the concentrated waste solids. This process is accomplished by utilizing filtered water to clean the contaminated sand. From here, the

regenerated sand is returned to the top of the filter bed, and the solids, or "reject", are piped back to the primary aerated lagoon.

ix. UV Disinfection System
x.

The UV disinfection system is designed to provide maximum dosage using low-pressure high intensity "AMALGAM" output technology at peak flow at end of lamp life. System has been designed based on calculations as outlined in the EPA design manual.

The system utilizes an enclosed chamber. The chambered design allows operators to change lamps without system shutdown. Configuration allows system to be piped using a variety of client defined sizes. Connections can be flanged or pipe threaded and are available in a variety of sizes.

The closed vessel provides user safety as well as some features such as automatic quartz cleaning and supplemental chemical cleaning. This insures that the protective quartz sleeves will be cleaned without having to breakdown the system.

10.0 System Design Parameters

i. Multistage Pond System

Cell 1 Cell 2 Cell 3 Cell 4 Cell 5

Parameter Aerated Anoxic Aerated Anoxic Aerated Total

Aeration Intensity Complete Mix Partial Mix

Covered No Yes No Yes Yes

Alpha 0.75 0.75 0.70

Beta 0.95 0.95 0.95

Theta 1.024 1.024 1.024

Site elevation (ft) 100 100 100

Minimum Dissolved Oxygen (mg/l) 2.0 2.0 2.0

kgs DO/ kg BOD 2.0 2.0 2.0

Ke @ 22 o C - summer (day -1) 1.61 0.30 0.30

Ke @ 16.0 o C - winter (day -1) 1.30 0.24 0.24

Pond volume (gallons) 2,771,340 4,342,140 12,896,460 4,342,140 2,815,528 27,167,608

water depth (ft) 15 15 15 15 15

Retention Time (days) 2.0 3.1 9.2 3.1 2.0 19.4

MAT diffusers (design) 220 50 10 280

SCFM per diffuser 10 10 10

Total SCFM (design) 2200 500 100 2,800

SCFM/ brake horsepower 20 20 20

brake horsepower (bhp) 110 25 5 140

Two 200 hp blowers (one operating, one standby) would be utilized. The power requirements

for the operating blower would be 140 bhp or 105 kW.

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ii. AquaMats® Design

Based on laboratory analyses, in addition to data collection and analyses of full-scale municipal

wastewater lagoons, ammonia and nitrate removal rates have been determined based on

effective surface area, and water temperature. These removal rates are used to determine the

number of units required for ammonia reduction.

The AquaMats® design is based on reducing the ammonia and nitrate concentrations to <1

mg/L in the effluent. Model 15004 AquaMats® (1.8m wide by 3m submergence depth) have

9,500 ft 2 of effective surface area. 13,000 units would be used for this application.

iii. Upflow Gravity Sand Filter

The upflow gravity sand filter is designed to handle 1.4 mgd with solids loading of 30 mg/l. A

controlled methanol injection system would be implemented to provide a carbon source for any final denitrification required in the sand filter. Approximately 5% of the influent would be rejected from the sand filter back to the primary aerated cell.

iv. UV Disinfection System

The UV disinfection system is designed to handle 1.4 mgd flow. Faecal and total coliform bacteria counts would be less than 100 and 200 respectively per 100 ml.

Because of the long system retention time (19.4 days) the tertiary treatment system does not need to be designed for peak wet weather flow. The pond system can absorb these peaks without immediately changing the effluent flow.

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11.0 Budgetary Capital Cost Analysis

The total budgetary capital cost for the design, supply and installation of the proposed system is

illustrated in the following table:

Description Total

Excavation/Sitework

Common Excavation/place/compact

Access Roads and site works

HDPE 60mil Liner

Perimeter fencing

Intercell Piping

Total Excavation/Sitework 955,500.00 $

Primary Process Equipment

Septage Receiving Station

Process piping and valving

Total Primary Process Equipment 170,000.00 $

Secondary Process Equipment

Aeration Equipment

AquaMats Biofiltration Media

Permeable Floating Cover

Total Secondary Process Equipment 3,727,000.00 $

Tertiary Process Equipment

Gravity Sand Filter

UV Disinfection Facility

Methonal Injection System

Total Tertiary Process Equipment 1,040,000.00 $

Headworks Building

Civil/Structural

Electrical

Mechanical

Total Headworks Building 650,000.00 $

Sub-Totals

Excavation/Sitework 955,500.00 $

Primary Process Equipment 170,000.00 $

Secondary Process Equipment 3,727,000.00 $

Tertiary Process Equipment 1,040,000.00 $

Headworks Building 650,000.00 $

Engineering and continency (25%) 1,635,625.00 $

Total Project Cost 8,178,125.00 $

All budgets in USD

Not included in any of the above costs are:

· Wastewater piping or pumping to or from the WWTP.

· Land costs

· Permitting or approvals

All pricing is budgetary and is subject to final engineering and design.

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12.0 Operation and Maintenance Costs

All operation and maintenance projections are budgetary only and are subject to final

engineering and design.

OPERATION & MAINTENANCE COSTS

Item Description

bhp kW 0.1500 $ Annual

Electricity

Aeration Blowers 140.0 104.4 137,234.16 $ 137,234 $

UV 15.0 19,710.00 $ 19,710 $

Total Electricity 119.4 156,944 $

Item Description

Daily Monthly Annual

Scheduled Maintenance

Diffuser replacement (every 10 years) 8,000 $

Blower oil changes, air filter, belt replacement 2,000 $

UV lamp replacement 15,000 $

Total Scheduled Maintenance 25,000 $

Personnel

One full time operator 200.0 $ 6,083 $ 73,000 $

Two full time helpers 200.0 $ 6,083 $ 73,000 $

Total Personnel 146,000 $

Sub Total Annual Operation Costs 327,944 $

Administration and Continency 40% 131,178 $

Total Annual Operation Costs 459,122 $

Total Daily Operation Costs 1,258 $

Electrical cost per kWh is estimated Design flow (gpd) 1400000

Operation Costs ($/1000g of flow) 1.11 $

Total Costs

Annual power Cost

Power

Requirements Total Costs

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13.0 Summary

Use of a multistage lagoon system as presented in this proposal poses significant advantages over conventional shallow pond systems or mechanical plants:

· No ongoing environmental implications or costs relating to handling and disposing sludge.

· No odors.

· Low capital costs.

· Low operating costs.

· Meets effluent criteria

Questions or comments can be directed to:

Nelson Environmental Inc.

101 Dawson Road

Winnipeg, Manitoba, Canada

R2J 0S6

Tel: 204-949-7500

Fax: 204-237-0660

Contact: Martin Hildebrand, P. Eng.

Email: mhildebrand@nelsonenvironmental.com

CASE	805.524.0800	contact us	search	site map

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